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EQUINE HAEMOLYTIC DISEASE

Parturient and Post-parturient Treatment of Antibody Positive Mares and Their Foals

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INTRODUCTION

Although a satisfactory technique for exchange-transfusion has been devised and is available for treating foals which suffer from haemolytic disease, it is difficult, expensive and must be carried out soon after onset of symptoms and before cardiac exhaustion or irreversible damage resulting from anoxaemia occurs in the major organs and tissues of the body. The mortality rate is very high in untreated cases. In the horse, a method of determining whether or not a suspected pregnant mare is undergoing iso-immunisation is available, and fortunately, by taking appropriate precautions, the disease may be prevented in the newly born foal. In the human being, the disease cannot be prevented in this way. Theoretically, once a mare has had an affected foal there is really no reason why she should ever have another, provided the owner seeks advice from his veterinary surgeon and complies with the necessary instructions, which are simple and practical.

This note is intended to give the essential information to veterinary surgeons in practice under whose charge mares which are known to have become iso-immunised to the red cells of their foals are placed for foaling. The details are based upon work carried out at the Equine Research Station of the Animal Health Trust at Newmarket during the past six years, and since the number of mares which are known to have been sensitised in this way is now upwards of 50, including breeds other than thoroughbreds, it is thought advisable to publish the relevant details. From correspondence it is clear that there may be some veterinary surgeons who are unfamiliar with the details of management, and there may well be others who would like to have this information for their guidance.

IDENTIFICATION

A knowledge of the iso-immunisation of the mare is based upon a series of two or three tests of pre-foaling blood samples. The samples, taken for preference at four weeks, two weeks and one week before foaling date, are tested by a direct agglutination technique and the indirect (Coomb's Test) method of identifying the presence of complete and incomplete anti-erythrocyte agglutinins (called " antibodies " for convenience). Suitable dilutions of the mare's serum are used and a titre is determined for each sample.

Where a positive titre is absent or very low (*e.g.*, 1 : 2 or 1 : 4) and remains stationary during the last month and especially at the last test one week before foaling, the result indicates either absence of immunisation or a residual titre from a previous iso-immunisation and the present foal will not be affected. Where the titre is initially low and increases at second and third tests, and in all cases where the titres are high (*e.g.*, 1 : 32 or more), the indications are that the mare's serum contains an active antibody associated with the present foal's red cells, and unless precautions are taken, the foal will almost certainly be affected and may die.

There is no strict relationship between the level of the titre in the mare's blood and the severity of the symptoms in the foal, nor of the time of onset of the acute symptoms of erythrolysis. Mares with titres of only 1 : 16 may produce foals which become severely affected at 24 to 30 hours of age, and mares with titres of 1 : 1,024 or more may have foals which appear clinically less severe, or only develop symptoms after three or four days.

PRECAUTIONS IN KNOWN OR SUSPECTED POSITIVE CASES

Since the colostrum of a sensitised mare at foaling contains four to six times (or more) the concentration of antibodies in the blood serum, it is essential to prevent the foal sucking for about 36 hours and to remove and discard as dangerous the colostral milk during this period. To effect this the mare must foal under supervision and the foal *must* be muzzled at birth. A leather box-muzzle, with several $\frac{1}{2}$-inch perforations opposite the nostrils, stitched or buckled to a small foal's head collar has been found best and should be provided previous to foaling.

The mare may be milked out by hand, or better by using a human breast-pump. Even very sensitive mares, which may resent hand milking, tolerate a breast-pump very well. The colostral milk should be removed as thoroughly as possible so as to empty the udder every three hours during the period. The colostrum should be discarded.

FEEDING THE FOAL

The foal must be fed artificially during the 36 hours when sucking is denied, to avoid the onset of protein starvation and to initiate normal digestive functioning. A period of about 8 to 10 or 12 hours is probably the longest time which a newly born foal can tolerate absence of food, and it is highly desirable that no time be lost after foaling before the first artificial feed is given, if possible within the first one to two hours, which is the natural period.

The following are satisfactory methods of feeding, in order of suitability:—

(*a*) Colostrum from another healthy mare, known or believed not to be immunised and if possible having foaled about the same time. Most mares have an excess of colostrum during the first 24 to 36 hours after foaling, beyond the needs of their own foals.

(*b*) Mare's milk from a recently foaled mare not necessarily colostral in type.

Both these can be given at blood heat without further preparation. A clean glass bottle fitted with a soft and fairly large lamb's rubber teat is a convenient and satisfactory vehicle.

(*c*) Cow's colostrum, or milk from a newly calved cow which is tuberculin-tested, healthy and clean. (Cows of the Channel Islands breeds should be avoided if possible since the high fat content of their milk is not well-digested by the newly born foal.)

This cow's colostrum or milk is best treated as follows:—

Mix about five parts with one part of saccharated lime water and to every 8 oz. or so of the mixture add about 1 oz. of blackcurrant juice ("Ribena" is suitable) to supply vitamin C. These two substances also reduce the size and consistence of the milk clots in the foal's stomach. Warm to a little above body heat (*e.g.*, to 104° F.) and give to the foal by the bottle and teat as above.

If the foal is backward in sucking, the addition of ½ oz. of glucose or of ordinary white cane sugar will sweeten and increase the palatability of the mixture.

Foals will take about 4 to 6 oz. an hour or so after birth for their first feed, and may be given a similar amount two hours later if thought advisable. Otherwise, feeds of up to 10 or 12 oz. or a little more for a big, strong, vigorous foal are required every three or four hours until natural sucking is allowed, except that it is not absolutely essential to feed between 10 or 11 p.m. and 6 a.m. next morning.

Strict precautions regarding immediate rinsing and subsequent sterilising of bottle and teat and any other receptacle used for the milk or mixture are necessary, and grooms should be advised accordingly.

Substitution Therapy

The newly born foal during its first 36 hours of life has a globulin-permeable intestinal mucosa, and is highly susceptible to absorption of toxins and to bacterial infections. Antibodies against various bacteria normally present in the dam's colostrum are denied to the muzzled foal and artificially substituted antibody protection has been found necessary.

The present practice at the Equine Station is to give intramuscularly 1,000,000 units of soluble penicillin and 1 gramme of dihydrostreptomycin at birth and again at 18 hours of age. In very weak foals, or if the temperature rises, a third course may be advisable, after a further 18 hours. In our experience, this method has prevented subsequent septicaemia or localised infections (joint ill, etc.). Before it was adopted several foals were lost from these conditions supervening at three to five days of age or later. (Cronin, 1954.)

Normal equine colostrum is also rich in vitamins A and D and these also are denied the muzzled foal. To substitute, we find it useful to give intramuscularly 2 ml. of vitamin A in oil and 1 to 2 ml. of vitamin D_3 in oil, in each case using a preparation standardised to contain 100,000 I.U. per ml.*

Since these vitamins in oil are absorbed slowly from intramuscular areas there is no need to repeat the dosages; any excess beyond immediate needs is stored in the body. Care should be taken to ensure that the needle does not accidentally penetrate a vein, and the thickest part of the triceps mass seems to us the most appropriate site for these injections in the very young foal.

General Care

It is desirable to keep both mare and foal in a loose-box while the foal is muzzled and also until it is sucking well, perhaps two days later, no matter how warm the weather may be out of doors.

*Dosages given are for normal thoroughbred foals; the amounts may be increased or reduced as required for other breeds.

Foals under this system of control may suffer from retention of meconium or constipation just as do normal foals and may require appropriate steps to be taken. Otherwise no special precautions beyond what is normal management are needed.

When the foal is being fed, it is a good plan to instruct the groom to hold the bottle near the mare's udder inside her thigh if possible. This enables the foal to associate artificial feeding with the normal site, and will do much to prevent it associating the groom with its food instead of its dam. Otherwise, even in the short space of some 36 hours, many foals become conditioned to a groom/food association, and when the muzzle is removed may have to be re-educated to suckle normally, which sometimes presents a difficulty, since the foal is stronger and will not readily lower its head to reach the teat.

Similarly, an occasional mare may resent her foal suckling normally after the muzzle is removed, and when she is beginning to become conditioned to artificial milking. Generally, it is sufficient to have a man hold the mare's head while the groom guides the foal to her udder. Subsequently, little or no trouble should be encountered.

Apart from the precautions outlined above, both mare and foal may be treated in the normal manner.

THE ISOLATION OF *TRICHOPHYTON DISCOIDES* FROM CATTLE

BY

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The isolation of cattle ringworm fungi is always rendered extremely difficult, or even precluded, by the growth of saprophytic moulds in the primary cultures. Direct inoculation of infected hairs on to Sabouraud's maltose, 2 per cent. malt or beerwort agar invariably results in the profuse development within 48 hours of species of *Absidia* and *Mucor* and later of *Aspergillus* and *Penicillium*, so that any growth of the dermatophytes is completely obscured.

A number of methods previously described for the isolation of dermatophytes has recently been tried on skin scrapings from cattle but none was particularly successful. Curry's (1949) method involving the use of a separate drop of agar for each hair or skin fragment resulted in a few isolations, as did the dilution technique of Hoerlein (1945), but contaminating moulds always developed rapidly, even when the selective medium of Littmann (1947) was used. The retention of samples for 12 to 15 days after collection to reduce the mould and bacterial growth, as advocated by Lebasque (1933), was not practicable when dealing with outbreaks requiring immediate treatment. Georg (1953) has effectively demonstrated the use of a selective medium containing 0·1 mg. per ml. cycloheximide (actidione) for reducing the growth of mould contaminants when isolating *Trichophyton verrucosum** from cattle hairs and by this method has obtained three times the number of isolations made from other media using the same samples. The antibiotic, however, is not at present available in this

* Some authorities consider the three species of faviform Trichophytons distinguished by Sabouraud as *Trichophyton discoides*, *T. album* and *T. ochraceum*, to be varieties of *T. verrucosum* Bodin.

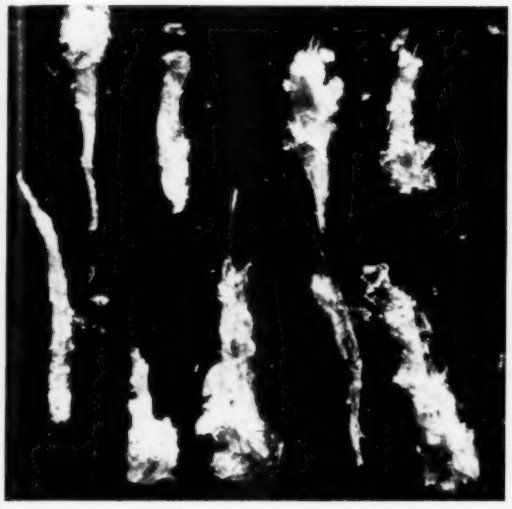

PLATE I.—Infected hairs with sheaths of epidermal cells. × 15.

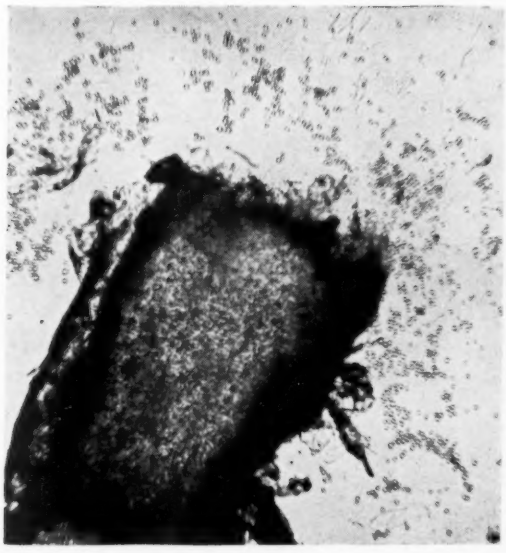

PLATE II.—Broken sheath with spores released into surrounding water. × 250.

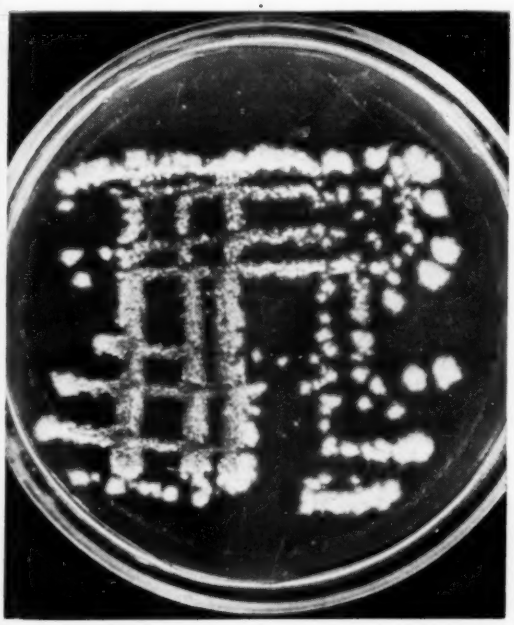

PLATE III.—Nutrient agar plate streaked with spores and incubated for six days at 35° C.

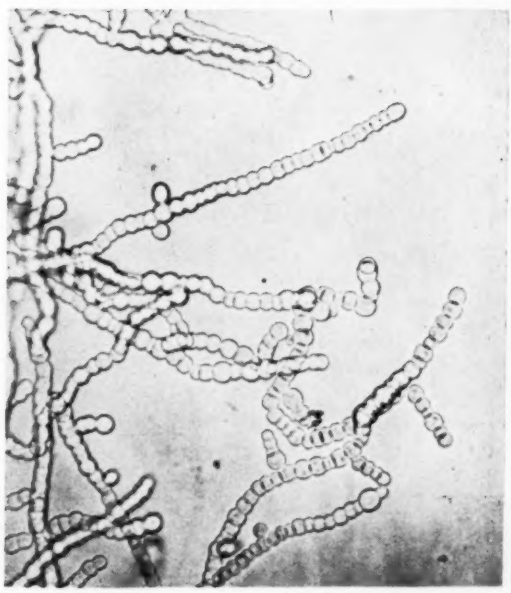

PLATE IV.—Chlamydospores from seven-day-old nutrient agar culture incubated at 35° C. × 500.

country and the need for a simple technique which would ensure the rapid isolation of the dermatophyte from material shown to be infected by direct examination, led to the development of the following method which has given satisfactory results during an extended trial in this laboratory.

Method

Infected hairs are readily picked out under a binocular microscope (× 30) by their basal sheath of desquamated stratum corneum cells. (Plate I.) By gentle pressure with a broad needle such hairs can be freed from each other and transferred to a drop of sterile water on a slide. Subsequent dissection is made easier by allowing the hairs to soak for half an hour, but this is not essential. By careful manipulation with fine needles the outer layers of the sheath can be removed so that only those layers directly above the spore sheath remain in place. The hair is then rapidly washed in several further drops of sterile water and the remainder of the sheath broken away or slipped off the hair in the last drop. This is done by securing the basal end of the hair under one needle and sliding the other, with gentle pressure, along the length of the sheath, thus liberating the arthrospores into the surrounding water. When viewed against a black background the spores can be seen as a cloud of refractive dots, even though they are exceedingly small (2 to 5 μ diameter) (Plate II). When this operation has been repeated enough times to give a dense suspension of spores (once is often sufficient), the pieces of sheath and the hair are drawn to one side and the spores streaked out on to a plate of nutrient agar (with added penicillin and streptomycin) of the following composition:—

Beef extract (Lab. Lemco.)	...	10·0 grammes
Peptone	...	10·0 ,,
Sodium chloride ...	...	5·0 ,,
Agar	...	15·0 ,,
Water (distilled) ...	...	1,000 ml.

The medium is made up, steamed and tubed in the normal manner and sterilised for 15 minutes at 15 lb. per inch^2 (*c.* 120° C.). Penicillin 20 units per ml. and streptomycin 40 units per ml. in sterile water solution are added to the medium after cooling to 55° C., before the final pouring (Georg *et al.*, 1951). The medium is adjusted to *p*H 7·5 and 20 ml. per plate have been found adequate.

When the arthrospores are poorly developed, *e.g.*, in early infections, the infected hairs themselves can be cut up and plated out after being freed from epidermal tissue and washed in the way described above. The whole operation, including the preliminary examination of the scraping in 20 per cent. potassium hydroxide, can be carried out in 10 minutes.

At 35° C. germination occurs within 12 hours and the colonies reach a diameter of 3 to 4 mm. in seven days (Plate III), at which stage the characteristic chain-like chlamydospores of *T. discoides* are usually present (Plate IV). Although determination may be hazarded at this stage, a colony with all the necessary diagnostic features takes at least 14 days to grow to 10 to 12 mm. diameter at this temperature on nutrient agar and rather longer on Sabouraud's dextrose or maltose agar.

Discussion

The method has proved highly successful for isolating *T. discoides* from cattle hairs and equally useful for *T. equinum* from horses. It has failed only four times out of the 50 microscopically positive samples examined, and on each occasion this was due to the loss of viability by the spores after the lesions had received treatment.

Nutrient agar was selected as the most suitable for the isolation of *T. discoides* because it was found to give a higher growth rate than Sabouraud, beerwort, Littmann, or malt agar. The addition of the antibiotics to suppress bacteria does not affect the growth of the fungus.

As the method is based on a physical separation of the spores and hyphae of the contaminants from those of the dermatophyte, its application is limited to samples in which the infected hairs can be picked out. This would not seem to be a serious disadvantage, for the present diagnosis of ringworm must rest either on the finding of such hairs, or the isolation of the fungus. The fact remains that about one half of all samples recently received at this laboratory from cases diagnosed as ringworm or suspected ringworm have proved to be microscopically negative for dermatophytes. Some of these may be taken from conditions other than ringworm, whilst others eventually give a dermatophyte on culture, but it is obvious that a method using a medium selective for the pathogen, such as that of Georg (1953), would be preferable to that outlined here, so that much larger samples could be examined for the fungus without further expenditure of time.

This method was developed during a survey of animal mycoses in Britain sponsored by the Agricultural Research Council.

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Survey of Animal Diseases

The yearly cost of livestock diseases in Great Britain had been estimated at about £80,000,000—15 per cent. of the annual value of livestock output, Dr. A. W. Stableforth, Director of the Veterinary Laboratory and Investigation Service of the Ministry of Agriculture, stated at a meeting of the Farmers' Club.

How much that estimate was on the high or low side it was not easy to know. For certain diseases there was a good deal of evidence on prevalence and the loss entailed; other figures were much more conjectural. But even on the admittedly insufficient figures—which the Ministry were now seeking to supplement by a disease survey—it was not difficult to believe that the loss was large, and certainly more than could be faced with equanimity. A great deal of this loss was ultimately preventible but much was unavoidable because means had not been found to prevent it.

* * * * *

R.A.F. Piggeries

In his report on the Air Services Appropriation Account for 1952-53, the Comptroller and Auditor-General observed that pig keeping on R.A.F. stations has become a remarkably profitable sideline run by the men in their spare time for the benefit of unit welfare funds. In the last few years R.A.F. pig rearing had greatly increased in scope. A profit of no less than £73,000 had been made in the year under review.

NEMBUTAL ANAESTHESIA IN SHEEP

BY

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Wright (1933) was the first to introduce nembutal in this country for cats and dogs, and it has proved to be the most satisfactory anaesthetic for these animals. Lukens (1938) employed nembutal in order to anaesthetise goats for the purpose of pancreatectomy.

Phillipson & Barnett (1939) have reported on the use of nembutal in sheep. They found that in lambs up to two months old a dose of 1/5 grain per lb. by slow intravenous injection gave anaesthesia of sufficient depth and duration for satisfactory abdominal operations. In adult sheep, however, the duration of anaesthesia was shorter, lasting only about 15 minutes, and one or more additional doses had to be given before the completion of the operation. The initial dose to induce anaesthesia in older sheep varied from 1/5 to ¼ grain per lb.

They concluded that nembutal was not a satisfactory anaesthetic for prolonged operations on sheep, as tolerance was great and the duration of anaesthesia for a single injection was only about 15 minutes. It was, however, useful for minor operations of short duration.

Methods of Restraint and Administration

The anaesthetic used was Veterinary Nembutal (Pentobarbitone Sodium—Abbott). The dose given was that recommended, *i.e.*, 1/5 grain per lb. bodyweight. The animal was restrained as follows:—

An assistant sitting in a chair held the sheep in such a manner that it was sitting on its hind quarters. He held each foreleg with the corresponding hand, and had the head tightly held under the right arm so as to stretch the neck and facilitate the bulging of the left external jugular vein. In the case of older sheep, the operator pressed lightly with his feet on the animal's hind feet, but this was not necessary for lambs.

The injection was given by slow intravenous method, giving half the dose immediately and the other half slowly so that the whole dose was given in two minutes.

Course of Anaesthesia

The following example will illustrate the course of anaesthesia:—

Thirty-two c.c. nembutal were administered to a' sheep weighing 160 lb., *i.e.*, 1/5 grain per lb. The first indication that the drug was taking effect was the slow respiration. Then the pupils were constricted and muscular relaxation set in, indicated by the fact that the head when lifted fell limply; and although the jaws were not completely relaxed the animal could not bite and the tongue hung out limply. The interdigital reflex was slight at this stage and injection was continued until the interdigital reflex was completely lost. At this stage the corneal reflex was almost absent and the respiration was slow but regular. The loss of the interdigital and corneal reflexes indicated that the stage of deep anaesthesia as described by Phillipson & Barnett had been reached.

The duration of this stage was maintained for about 36 minutes in lambs, and 27 minutes in sheep.

Excessive salivation occurred, and to guard against the collection of saliva in the pharynx, the animal's head was kept downwards throughout, so that the saliva escaped freely from the mouth.

Conclusion

The writer, during his studies on sarcosporidiosis in sheep, performed a large number of muscle biopsies under nembutal anaesthesia and it is his experience that the duration of nembutal anaesthesia for a single injection was about 27 minutes in adult sheep. The anaesthesia was of similar depth to that obtained by Phillipson & Barnett over 15 minutes.

Acknowledgment.—My thanks are due to Professor P. C. C. Garnham and his staff of the Department of Medical Protozoology, and to the staff of the animal house of the London School of Hygiene and Tropical Medicine.

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SOME OBSERVATIONS ON THE MARKETING AND TRANSPORT OF ANIMALS

BY

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It is difficult to classify the reasons why animals are sold, but stock are generally passed on to other owners, as distinct from being sold for slaughter, for the following reasons (Burrow, 1945).

Occasionally sales are held by a breeder on his retirement, or by his executors after his death, when the stock is disposed of in its entirety. Breeders of pedigree stock frequently have high-class animals which are surplus to their requirements, which can be used to found new studs or improve existing ones. There are breeders who breed stock for sale, for example, poultry farmers selling first-cross pullets to farmers or back-yarders for laying. Then there are breeders of a poorer type who invariably sell to others the less healthy animals culled from their stocks, and there are dealers whose primary aim is to make a profit from the sale of animals passing through their hands.

Animals sold for the first three reasons (at disposal sales, surplus to the breeders' requirements, or bred for sale) are generally of good quality, for in the first case they were intended for the owner's own use, and in the other cases the vendor wishes to make a name for his stock so as to attract future purchasers. Stock sold by the breeders because they are diseased may well introduce disease into the purchaser's premises and infect his animals. Stock purchased through a dealer, and which have passed through his premises, are always liable to come in contact with infectious agents introduced by other purchases, and in this connection it should be noted that some breeders who would consider it unsporting to sell a diseased animal to a fellow breeder consider it clever to sell it to a dealer.

It is undoubtedly most satisfactory if animals are sold direct from the breeder to the purchaser, without passing through a market, shop, or dealer's premises, for in this case there is only a chance that disease will be picked up in transit; but as this is not always practicable, markets and shops are necessary for the disposal of animals.

Race-horses are sold at auction sales arranged by firms specialising in this business, by agencies who select them for owners who know little about horses, or for breeders abroad,

and by private sales. Cart-horses for town work are largely purchased through dealers, while hunters and children's riding ponies are acquired privately, at sales or through dealers. Although strangles, equine influenza and ringworm can be introduced into a stud when a new horse is purchased, in general if an owner buys a " dud " he only acquires an animal which is itself useless—he does not ruin the healthy animals he already owns by introducing an infection, as so frequently happens with the purchase of cattle.

The difficulty with the sale of cattle is that the most prevalent disease conditions such as tuberculosis, mastitis, Johne's disease and trichomoniasis can only be recognised on inspection if present in a relatively advanced state ; yet animals in the early stages can infect others. Purchasers acquiring cattle privately can be guided by the disease history of the herd—not only of the individual animal. However, most cattle are acquired through dealers or the sale ring, and to-day a shortage of working capital is causing many of the smaller farmers to purchase their milking cows through dealers, obtaining them on a hire purchase system. At many sales, provisions are made under the Conditions of Sale for Dairy and Store Cattle at Markets, published by the Chartered Auctioneers' and Estate Agents' Institute, and recommended for use by other bodies including the National Farmers' Union and the British Veterinary Association, which allow the auctioneers to exclude from, or put out of, the sale premises any animal which shows signs of any disease, whether infectious, contagious or not ; but there are still cattle sold at markets which are capable of transmitting disease.

Some Market Problems

The general market inspection of stock prevents the spread of the scheduled diseases, and may assist the Ministry of Food grading inspectors if an animal is reported to them as being unfit ; but it is of no use in preventing the spread of other diseases such as mastitis, for the inspector has no control over them, and in any case there are not adequate facilities for a full examination of each animal.

Another point worthy of consideration is the frequency with which cows very near to, or within a day or two of, calving are exposed for sale. It would be very difficult to break this habit, but surely on the one hand a beast should be allowed a few days to settle in her new surroundings before calving, and on the other hand should have a week to recover her vitality after calving before being exposed to the adverse conditions associated with the transport to and handling at markets. Additionally, and particularly in these days of widespread milk-recording, it is not necessary for cows to be stocked for sale. This practice is not only unnecessary, it is also cruel, and may damage the udder and render it liable to infection. At some of the larger markets the cattle have to arrive on the day prior to sale, and lactating cows are milked at stated times on the evening before, and on the morning of, the sale. The recommended conditions mentioned previously suggest that cows should be milked out not earlier than the evening before the sale, must not be offered in an overstocked condition, and must have their udders eased before transport. Thus they enter the ring in a comfortable condition. The overnight accommodation required, of course, prevents this system being adopted in most places.

The conditions under which young calves are marketed in certain areas leave much to be desired. They are brought down from the warm calf pens on the farms where they were born, and exposed in a damp, draughty pen, and very often miss a meal. Is it any wonder that they often develop scours or pneumonia ? In those cattle-rearing areas where the collective marketing of calves is necessary they should be well housed and regularly fed. Pigs, also, are very susceptible to changes in environmental temperature, and should always be housed under cover and in reasonably warm conditions if marketed in winter. Sheep, on the other hand, are acclimatised to outdoor conditions, and at sheep sales where they are penned outside the purchasers suffer more inconvenience than the sheep. There are many sheep dealers who assist lowland farmers who wish to obtain relatively small numbers of sheep, by purchasing them at the auction sales conducted in the breeding areas, and making a fixed charge, sometimes a shilling a head, for the service.

There is one aspect of hill sheep marketing which may lead to unnecessary suffering—the housing and artificial feeding of ram lambs and shearlings. Farmers judge rams on their conformation and size, considering that they will stamp these qualities on their progeny. As rams which have been done well always look more impressive than those which have been brought up in the rough on a hill, they fetch the higher prices ; but when they are turned out on the purchaser's hill to fend for themselves, they are unused to the conditions, and rapidly lose condition. Some die of malnutrition, aggravated by the demands made on their strength by their stud duties.

With regard to the marketing of fat stock, the aim should be to send them, as far as possible, direct from farm to slaughterhouse, thus avoiding unnecessary transporting and handling. At present the majority of animals are taken first to collecting centres for the purpose of weighing and grading them alive, and are then sent to the abattoirs for slaughter. As a Joint Working Party set up by the National Farmers' Union to consider the marketing of fat stock says in its report (Marketing of Fat Stock, 1952), " Even from a humanitarian point of view revision of the present methods of handling fat stock intended for slaughter is highly desirable." This is emphasised by the Working Party's contention that " the transport of fat stock direct from farms to the place of slaughter will avoid the heavy depreciation in the value of carcases and hides which must inevitably be associated with the concentration of animals at an intermediate centre, and with the unloading, penning, progressing through the grading ring and re-loading of fat stock." This depreciation in value of the animals must be associated with discomfort, even if not with actual pain. In addition, of course, there would be a great financial saving in distribution costs.

The Sale of Pet Animals

The marketing of pet animals in the past has not always been very satisfactory, and for this reason the Pet Animals Act of 1951 was introduced, and came into force on April 1st, 1952. The most satisfactory way of acquiring pet animals—dogs, cats, rabbits and other small rodents, and British bred cage birds—is undoubtedly to obtain them direct from the breeder, if at all possible. Breeders are very keen to maintain a high level of health in their studs, and therefore the purchase is probably free from infectious disease. They are also jealous of their reputation, and therefore do not sell young animals until they are properly weaned and can live on a normal diet. These breeders advertise in weekly periodicals specialising in the particular species concerned. Unfortunately, the majority of the public do not seem to know of these journals and therefore, if they do not know of any stock being sold locally, they go to a dealer or pet shop. The conditions controlling pet shops state that the animals must be kept in accommodation which is suitable as regards size, temperature, lighting, ventilation and cleanliness, and that they must be adequately supplied with suitable food and drink, and visited at suitable intervals. In addition, all

reasonable precautions must be taken to prevent the spread of infectious diseases, and mammals must not be sold at too early an age.

Two other important provisions are that no one may sell animals as pets in any part of a street or public place, except at a stall or barrow in a market, and that no one may sell pets to children under 12 years of age. These provisions stop one cruel practice, that of hawking unwanted day-old light-breed cockerels, which are generally killed at hatching, round the streets and selling them for a few pence to young children, who treat them as toys, having no idea how to feed them or keep them warm. High quality pet shops have always endeavoured to perform a service by supplying healthy pets, and many go to a great deal of trouble to give advice to purchasers on their management ; but, soon after the last war, when there was a great demand for pets, especially puppies, many get-rich-quick dealers sold puppies at very young ages to unsuspecting owners, because the milk substitutes needed to wean them were in short supply and expensive.

Bird fanciers who wish to keep species which have to be imported must, of course, obtain these through dealers or importers. Many of high repute try to ensure that the birds they sell have been properly acclimatised, and are healthy, but there are others who offer birds at low prices immediately after transport, and losses in birds purchased through these channels can be very high. Because of the risk of psittacosis the importation of birds of the parrot tribe is now prohibited, except for zoological gardens, by the Parrots and Miscellaneous Birds (Prohibition of Importation) Order, 1953, and it should be noted that under the Protection of Birds Act, 1928, it is illegal to sell, though not to own, most species of British wild birds unless the birds bear a closed ring which can only be inserted over the foot before they are eight days old, indicating that they have been bred in captivity.

Transport

The transport of animals plays a very large part in agriculture to-day, but the moving of animals should undoubtedly be kept down to a minimum, for however much care is taken there is always a risk of injury, or of exposure to infection. Animals are transported by road, rail, sea and air. Their movement by the first three methods is controlled by law, but as yet there is no legislation dealing with air transport. In dealing with legislation reference is made chiefly to those regulations providing for the comfort of the animals and the avoidance of injury. Under the Transit of Animals (Amendment) Order, 1931, vehicles used for transporting horses and farm animals by road must have their floors fitted with battens to prevent slipping, and must carry a suitable falling loading door, also fitted with battens. The wheel arch must be protected with a permanently fitted shield, and each vehicle must be constructed so that a protective roof can be provided. Every vehicle must admit of inspection at a height of not more than 4 feet 6 inches from the ground. The various classes of animals must not be mixed, and cattle, calves, sheep, goats and pigs must be separated, except that a cow and its unweaned calf may travel together.

No animal may be carried if, owing to illness or fatigue, it will suffer unnecessarily, or, in the case of a cow, if it is likely to calve on the journey. Animals must not be over-crowded.

The Transit of Animals Order, 1927, states that trucks used for rail transport must have the floors fitted with battens, must have falling doors, and must admit of ventilation and inspection at floor level. Each truck must have spring buffers at each end and must have a roof. Mixed consignments must be separated as for road transport, and during the winter months the sides of trucks carrying shorn sheep must be covered with tarpaulins. Cattle and pigs must be watered after 27 hours' travelling, and sheep after 36 hours ; but under the Transit of Horses Order, 1951, horses must be fed and watered at intervals of not more than 12 hours unless the journey takes only 18 hours, when they can be fed and watered after the journey.

The regulations for transport by sea under the Animals (Sea Transport) Order, 1930, differ according to length of the voyage. Ships travelling only from one port in Great Britain to another, or to Ireland, the Channel Islands, or the Isle of Man are considered as making local journeys. Animals must not be carried on more than three decks, and animals, other than sheep and pigs for local journeys, must not be carried on the bridge or shelter deck, and pigs and shorn sheep must not be carried there during the winter. Animals must not be carried on the open main decks, unless on local journeys, when in-calf cows and springers must be, and milch cows should be, carried there. All animals must be carried in pens, unless they are confined in crates, and the pen floors must have battens across to provide a foothold and must be strewn with sand, sawdust or other suitable material. On local journeys store and polled fat cattle need not be tied, but on longer trips cattle must be tied so as to stand facing the sides of the ship. This is because the angle at which a ship rolls from side to side is greater than the angle at which it pitches from fore to aft. There must be a continuous fore and aft passageway between every two rows of animals, and if a journey is to take over 18 hours the animals must be fed and watered. Every vessel must carry a humane killer in case of accidents. On arrival in this country animals are placed in lairage for 10 hours to give them time to rest, and are fed and watered. After this period they may continue their journey by rail or road.

Relating to the transport of horses there is an additional regulation under the Horses (Sea Transport) Order, 1952, for they must not be carried if there are reasonable grounds at the time of sailing for expecting that, owing to adverse weather conditions, the voyage would be attended by suffering to the horses.

Travel by Air

There are no specific regulations covering the air transport of animals. Aircraft have been used fairly extensively for transporting horses. Peatt (1952) describes the journey of the British equestrian team to Helsinki for the 15th Olympiad. The horses were accommodated in movable padded crates. The crates were made of wood, the sides and floors being covered with coconut matting, and the front and rear thickly padded with flock covered with imitation leather. Web belly-bands were fitted with the object of preventing the horses going down, as this is one of the problems of air travel, for they are prone to bend at the knees and hocks and lie down if the plane drops in an air pocket. They were not used, however, as the bands tickled the horses' bellies and caused them to start kicking, and Peatt considers it would be better to fit strong metal supports to each side of the crate, joined by a crossbar well clear of the horse's back, and attach a strong roller to it. The noise of the engines upsets horses more than anything else, and it might be a good plan to plug their ears with cotton wool, as this could be done with most horses. If a horse became unmanageable during a flight and endangered the lives of the crew it would have to be shot, for the administration of sedatives by stomach tube or intravenously while the aircraft was in flight would be almost out of the question. If sedatives were given before the journey there would, of course, be a risk of the horse going down in the crate.

This form of transport is being used for bovines from Ireland and the Isle of Man, and is becoming very popular for domestic and wild animals such as dogs, and various tropical birds (Stewart, 1949). For bovines the planes are fitted with aluminium standpipes made to the air company's specification, and the small animals are housed in suitable crates. During normal flights there is every reason to believe that these animals are carefully and considerately treated, but there is a grave risk they may suffer if the plane is unexpectedly grounded at an airport overnight or for a longer period, for the airports are not provided with suitable accommodation for animals. Small animals need not be delayed for long, for they could be transferred to another plane ; but if there was a mechanical breakdown in a plane fitted for carrying cattle it could not be repaired quickly.

Yet in the near future air transport will undoubtedly be more and more used. Consider the difference between about 24 flying hours from this country to Kenya and the weeks taken by ship and train. Certain countries, however (for example, Australia and New Zealand), will not allow animals to be imported by air, believing that the sea journey gives them time to show any disease conditions they are incubating.

The expansion of air transport would be facilitated if airports were provided with animal accommodation, for example, a building to house cattle, another fitted with kennels for dogs and cats, and a third for tropical birds, etc., the last two being suitably heated in winter.

Some General Considerations

Considering together the troubles associated with transport of animals of all types, the first point to be noticed is that many carters are more influenced by the value of the animal than by humanitarian considerations. If asked to move a hunter or a dairy cow valued at £150 each they are much more considerate than if they are handling a pony or cross-bred heifer worth £15 apiece. The greatest weakness in our transport system, not associated with infectious disease, is probably the long period animals are without water, though it must be acknowledged that when unaccustomed to travelling they will drink only when really thirsty. Injuries such as broken legs, injured eyes, or fractured angles of the haunch do not occur as frequently as might be expected, considering the large numbers of animals transported which are unaccustomed to being loaded into wagons. In connection with loading awkward beasts, electric goads are in many cases more effective than sticks as persuaders.

There are instances of swine fever, foot-and-mouth disease, and tuberculosis being carried by animals in transit. Under the Transit of Animals Order, 1927, and the Transit of Animals (Amendment) Order, 1931, after each load of animals has been discharged the vessel, wagon or vehicle must be scraped, swept, scrubbed or scoured with water, and then coated or washed with an approved disinfectant. It is, however, very difficult to disinfect wood once it has become worn, and it would be far better if the wagons could be made of aluminium. Although the cost of construction would be greater, the vehicles would be lighter and therefore cheaper to run. It would also seem that the time is coming when it might be possible to license certain vehicles for the transport of attested cattle only.

There are certain diseases which, as their names suggest, are particularly associated with transport—transit tetany, fever and erythema. Transit tetany is a metabolic upset chiefly found in cows during transport or within 24 hours afterwards. Heavily pregnant cows in good condition which have come direct from pasture are most susceptible, but it has also been observed in ewes and ponies. Transportation for hours without food or water, particularly during the summer months, is the exciting cause, and the condition generally responds to injections of calcium and magnesium. Transit fever is the name given to outbreaks of pasteurellosis occurring in animals fatigued by transport. Transit erythema in pigs may be found in one or two individuals after a long journey. They have generally lain down and their skins have become soaked with urine which causes lesions varying from red patches to black scabs on the hams and belly. Such pigs should be given a careful examination not because of lesions of transit erythema, but because they are often in the incubative stage of a disease such as swine fever, swine erysipelas, or anthrax, and it was this factor which caused them to lie down on the journey.

There is one rather specialised branch of large-animal transport, particularly horse transport, which should receive attention—the conveyance of invalid animals unable to walk (Kirk, 1952). At racecourses, especially, an ambulance with a floor height of about 1½ feet only, and with a mat on which the animal could be rolled on the ground, which could then be drawn into the trailer by a winch, should be available. This would avoid all the threats and coaxing needed for the type of wagon chiefly in use to-day, and would save injured animals considerable pain ; for they could, if necessary, be narcotised or anaesthetised before being moved.

The regulations controlling the conveyance of live poultry, which are the Conveyance of Live Poultry Order, 1919, and the Poultry (Exposure for Sale) Order, 1937, though good in intention, are unfortunately vague. Poultry must be protected from exposure to bad weather, and must be conveyed in adequately ventilated compartments. The birds must not unnecessarily be tied by the legs, allowed to remain so tied for a longer period than is necessary, or unnecessarily be carried head downwards. Birds must not be carried in any crate out of which they can protrude their heads, legs, or wings, and turkeys, geese, ducks and poultry must not be carried in the same receptacle unless confined in separate compartments. Receptacles containing poultry must be carried and deposited with care, and poultry must not be exposed for sale if they are ill, infirm or fatigued.

Day-old chicks are transported in thousands every year in cardboard boxes. They travel very well provided there is adequate ventilation, although cases of chilling on one hand and suffocation on the other are met. Small mammals are best transported in wooden boxes in small numbers. The boxes should have ventilation holes at the ends, protected by baffle plates, the lid should provide an outlet for expired air, and should not be flat, in order to prevent other boxes being stood on top.

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DISEASE PREVENTION IN CENTRAL AMERICA

Mexico and six other Central American Republics have agreed to form a joint organisation with the aim of combating crop and cattle diseases. The Ministers of Agriculture of the countries concerned met in San Salvador recently, and it was agreed as a beginning to set up a study and observation station. The station would engage, if necessary, the services of foreign scientists and technicians. Its aim would be to co-ordinate the work of all regional bodies and to direct veterinary and allied services when disease outbreaks occurred. If this scheme develops, it may make a useful contribution towards combating foot-and-mouth as well as other conditions.

CLINICAL COMMUNICATIONS

AURAL RESECTION WITH SHORT WAVE ELECTRO-SURGERY

J. D. HAWKINS,
CHICHESTER

Subject.—Five-year-old neuter cat.

Condition.—Papilloma in the external ear canal, extensive attachment.

Treatment.—Aural resection and excision of the papilloma.

Method.—Short wave electro-surgery.

The patient was anaesthetised with nembutal and the area clipped, shaved and sterilised.

Cutting needles and a ball electrode were also sterilised. The needle was used exclusively for cutting the skin, cartilage and mucous membrane of the external canal.

There was no haemorrhage at all whilst incising these structures. The growth in the canal was exposed and the base cut through with the needle. Slight haemorrhage occurred at this point but was checked by the use of the ball electrode.

The skin incision was sutured with nylon and healed by first intention.

During the primary incision there was considerable stimulus of the muscles of the ear and face due to some "faradic" effect but this did not continue into the deeper tissues.

At first it was feared that the apparent charring of the tissues after using the ball electrode would interfere with healing but this did not occur.

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ANOTHER CASE OF SURGICAL REPAIR OF THE TENDO ACHILLIS IN A CAT

G. J. NIJLAND

As a sequel to Joan O. Joshua's clinical communication in *The Veterinary Record*, **65**, 174, the following notes are offered on a case that occurred a few months ago.

The subject presented was a four-year-old spayed female European Shorthair. The left hind leg was in the position natural in rabbits, and examination revealed a 2-cm.-long slit, parallel to the tendo Achillis and just half-way between the original site of the tendon and the os tibia. The tendo Achillis was completely severed, not ruptured. The wound must have been inflicted by a very sharp and pointed instrument. The owners of the cat had found a broken jam-jar, half buried, which, presumably, had caused the injury.

Intraperitoneal kemithal anaesthesia was given and the original wound enlarged to obtain a good field. Down to the hock about 2 cm. of the tendon was available for manipulation, the other end having been drawn upwards by the muscles. The leg was kept in a stretched position. Unbraided nylon sutures were used for both tendon and skin. The sutures in the tendon were passed crosswise, a round needle being used. There was no connective tissue available to separate tendon from skin due to the trauma.

Penicillin (for intramammary injection) was used locally, with good result. Healing was by first intention. No plaster of paris was used in bandaging ; a light gauze dressing was applied, and this was strengthened and protected by 2-inch adhesive tape. This was changed every two days until the skin sutures were taken out, which happened on the eighth day.

Three days later the dressing was taken off, and after a further two days the cat was transferred to a bigger cage where more freedom of movement was permitted. The cat was encouraged to move about, and the leg was used, but only so far as comfort allowed. At first it was often held in a "rabbit" position but gradually a normal position was assumed.

The cat was sent home on the 26th day, but was restricted to a small room without high pieces of furniture. Later she was released in the house, and on the 30th day after operation went out for the first time, the leg being used normally.

ABSTRACTS

Toxic Hazards of Certain Pesticides to Man*

Dr. Barnes, who is Director of the Toxicology Research Unit of the M.R.C., has presented in this report a survey of the existing information on the toxicity to mammals of the preparations used for the control of ectoparasites of crops and livestock. The report commences with a discussion on the enormous benefits to food production and public health which has followed the use of the new insecticides. This appreciation draws attention to the man-saving activities of these compounds in a monograph devoted to their man-killing properties.

The toxic hazards associated with the manufacture and the application of the insecticides are discussed from all aspects. The toxic properties to mammalian life of both chlorinated hydrocarbon, and organic phosphorus compounds are considered in detail. The sections dealing with the chlorinated hydrocarbon insecticides describe the toxic effect of these preparations on large and small animals.

The evidence presented in this report, which carries a bibliography of 689 references, is critically examined in the light of experimental work, and from experience in the field. There is little doubt that the report will be accepted as the official reference for all relevant toxicological data.

D. W. J.

* **Toxic Hazards of Certain Pesticides to Man.** BARNES, J. M. (1953). *WHO Monograph Series* No. **16.**

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Bovine Hyperkeratosis (X Disease)*

This is a review article and gives a summarised general account of hyperkeratosis based on 25 references—clinical and experimental—from the U.S.A., in which country it was first described in 1941. In that country the disease is widespread and has caused considerable economic loss to animal husbandry, by death, or unthriftiness of recovered animals.

The disease is commoner and more severe in calves but cattle of all ages are susceptible. It is characterised by lachrymation, salivation, nasal discharge, variable appetite, intermittent diarrhoea, depression, red swellings in the mouth and on the muzzle, polyuria and loss of weight. Thickening and wrinkling of the skin—possibly with loss of hair—may occur on the neck and withers and may extend over the body. Internally the lesions include cystic dilatation of renal tubules, squamous metaplasia of epididymis, seminal vesicles, Gartner's ducts and salivary glands ; mucoid papillary proliferations in the bile ducts and gall bladder ; thickening of gall bladder ; fibrosis of pancreas and kidney and papillary growths in mouth and oesophagus.

* **Bovine Hyperkeratosis (X Disease).** LINK, R. P. (1953). *J. Amer. Vet. Med. Assoc.* **123.** 427–430.

All attempts to demonstrate an infective causal agent have failed, but there is plentiful evidence, both clinical and experimental, that hyperkeratosis is due to the ingestion of, or contact with, a toxic chemical agent, which is present in processed cereal concentrate, wood preservative derived from coal tar and in petroleum machine lubricants. The offending and common ingredient of these substances is a highly chlorinated naphthalene. This type of compound may cause hyperkeratosis if ingested or rubbed on to the skin and its excretion in milk has set up the affection in calves. Processed animal foods may become hyperkeratogenic due to their contamination by the machine lubricant.

Veterinarians should consider all lubricants and wood preservatives as possible sources of hyperkeratogenic substances.

There is no specific treatment, but since the chlorinated naphthalenes cause a diminution in plasma vitamin A, early cases may benefit from administration of this food factor. Prevention of further contact with the causative substance is an obvious requirement. G. H. A.

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Treatment of Chronic Lead Poisoning in Horses*

Lead poisoning is reviewed briefly. The calcium salt of ethylenediamine tetra-acetate (EDTA) is a compound which reacts with lead so that the calcium is replaced by lead. The lead salt of EDTA is non-ionisable and readily excreted. Four suffering from lead poisoning were treated successfully with the calcium salt of EDTA. The drug was given as a 2 per cent. solution in saline in a dose of 1·0 g. per 30 lb. bodyweight. The action of this drug appears to be largely confined to reacting with the lead in the soft tissues. Calcium EDTA appears to be of low toxicity to laboratory animals.

* **Treatment of Chronic Lead Poisoning in Horses with Calcium Disodium Ethylenediamine Tetra-acetate.** Holm, L. W., Wheat, J. D., Rhode, E. A., & Firch, Gladys. (1953). *J. Amer. Vet. Med. Assoc.* **920.** 383–388.

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Treatment of Acute Lead Poisoning in Calves*

Acute lead poisoning in calves was treated with calcium disodium ethylene diamine tetra-acetate acid (Ca EDTA), commercially known as "calcium versenate."

Lead ions or lead loosely bound to proteins replace the calcium forming Pb EDTA which does not ionise at physiological *p*H and is, therefore, non-toxic.

Seven calves were given lead acetate by mouth until signs of poisoning were produced. They were treated with EDTA (10 grammes as 25 per cent. solution) and four survived. Determinations of urinary and faecal lead showed that Ca EDTA caused its rapid excretion.

* **Treatment of Acute Lead Poisoning in Calves with Calcium Disodium Ethylene Diamine Tetra-acetate.** Holm, L. W., Rhode, E. A., Wheat, J. D., & Firch, Gladys. (1953). *J. Amer. Vet. Med. Assoc.* **123.** 528.

QUESTIONS IN PARLIAMENT

Humane Rabbit Trap

Mr. Peter Freeman (April 8th) asked the Minister of Agriculture whether he has now completed the trials with the new Imbra humane rabbit trap; what steps he is taking for its introduction; and when they will become effective.

Sir T. Dugdale: With regard to the first part of the Question, I would refer to the reply given on February 18th last to my hon. and gallant Friend the Member for Wembley, North (Wing Commander Bullus). The production and sale of this trap is a matter for the manufacturers. It is already on sale.

Breeding Licences for Boars

Mr. Remnant asked the Minister of Agriculture the procedure for obtaining a breeding licence for a non-pedigree boar; and what method of appeal is available to the applicant under his regulations.

Sir T. Dugdale: An applicant for a breeding licence for a boar, whether pedigree or non-pedigree, is required to submit the animal for inspection by one of my officers. If a licence is refused, the applicant may appeal within 14 days and request a second inspection by a referee appointed from a panel of nominees of approved pig breeding societies and the National Farmers' Union. Under the Improvement of Livestock (Licensing of Bulls) Act, 1931, and the Agriculture (Miscellaneous Provisions) Act, 1944, the referee's decision is final.

Mr. Remnant: My right hon. Friend will surely agree that his livestock officers are not allowed to approve non-pedigree boars for breeding. In view of that, is it not unfair to put the referee in the position of juror, judge and appeal court?

Sir T. Dugdale: The referee is at liberty to do exactly what he likes. In fact, the licensing of boars started on April 1st, 1946, and during the eight years the system has been in operation it has worked very satisfactorily.

Mr. Spearman asked the Minister of Agriculture whether his Regulations allow a licence to use Landrace boars for breeding purposes to be granted to boars which are not pure bred.

Sir T. Dugdale: As I said in reply to my hon. Friend, the Member for Maidstone (Sir A. Bossom), on March 31st, it is my policy to licence only those boars that are pure-bred, whatever their breed. This is because the purpose of licensing is to ensure that boars used for breeding will breed true to type, and this cannot be achieved by the use of cross-bred boars.

Mr. Spearman: As my right hon. Friend has decided to deny to these impure animals the natural right to breed and live, does he not think it would save the farmer from loss and the Ministry from expense if, instead of sending inspectors and then referees to the farms, the position of these unfortunate animals could be made clear from the beginning?

Sir T. Dugdale: No, Sir, the referee is there to make a decision entirely irrespective of the first inspection which takes place and I am bound, as well as the owner of the boar, by that decision. If he thinks fit, the referee can licence a non-pedigree boar.

Mr. Kemnant: How can my right hon. Friend reconcile his statement that his policy is to licence only pedigree boars when he gives the routine for licensing cross-breds?

Sir T. Dugdale: If my hon. Friend looks at the answers he will see that they tie up.

Report of the Advisory Committee on Myxomatosis

Mr. E. Wakefield (April 9th) asked the Minister of Agriculture if he has now received a report from the Advisory Committee on Myxomatosis* under the chairmanship of Lord Carrington.

Sir T. Dugdale: Yes. The Committee reported on March 16th and the Secretary of State for Scotland and I have accepted their recommendations.

MYXOMATOSIS

Summary of the Report of the Advisory Committee*

The Advisory Committee was appointed in October, 1953, by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland "to advise on the problems arising in connection with myxomatosis in rabbits and the action that should be taken by the Government."

The first outbreak of myxomatosis in wild rabbits in this country was confirmed on October, 13th, 1953, in Kent, and the second on October 27th in East Sussex. Attempts were made to contain the disease at these centres of infection by the erection

*Myxomatosis: Report of the Advisory Committee on Myxomatosis obtainable from H.M.S.O., Kingsway, London, W.C.2, or any bookseller, price 9d.

of rabbit-proof wire fencing and the extermination of the rabbits in and around the enclosed areas. Outbreaks of the disease have now been confirmed at 17 places in south and south-eastern England (*i.e.*, seven in Kent, three in East Sussex, four in Essex, two in East Suffolk and one in the Isle of Wight), and the rate at which it spreads in the coming months may depend largely on the numbers and distribution of rabbit-biting mosquitoes and other insect vectors.

In laboratory experiments and natural outbreaks among laboratory rabbits, over 99 per cent. have died from myxomatosis. Similar high mortalities were experienced amongst rabbits kept in outdoor cage plots. The Australian epizootics of 1950-51 and 1951-52 were also characterised by very high mortality wherever the disease took hold. In a few areas, however, there was a falling off in the mortality rate in the second year and recent reports indicate that some survivors have acquired immunity. It is believed that the mortality rate in Australia has now fallen considerably, and this is probably the beginning of the process of adjustment between the disease and the rabbit. Under natural conditions this process might possibly continue until myxomatosis ceased to be a "killer" disease.

In connection with the protection of domestic rabbits, the Report continues:—

"We recognised from the first that special consideration would have to be given to the protection of the domestic rabbit industry against myxomatosis. In addition to the very large number of tame rabbits bred for utilitarian and show purposes, the industry supplies some 35,000 to 40,000 rabbits each year for use in laboratories, mostly for medical work. The infection of these rabbits or the stoppage of the supply would have serious consequences. Fortunately, the first outbreaks in wild rabbits occurred late in the autumn when the danger of a rapid spread of the disease by mosquitoes was unlikely. This gave a period of grace to consider ways and means of providing protection for domestic rabbits. The only known prophylactic against myxomatosis is a living preparation of the virus of Shope's fibroma. We were glad to learn at our first meeting that arrangements had already been made at the Ministry's Veterinary Laboratory at Weybridge to examine the value of a similar vaccine to that being prepared at the Pasteur Institute in Paris. There are many aspects of vaccination which require further study. Nevertheless, if the disease spreads after the coming spring, the vaccine should be made available at a reasonable cost to domestic rabbit breeders, preferably through commercial channels. Inoculation is not, however, the only or even necessarily the best way of protecting domestic rabbits from the disease and present evidence is that it does not protect every rabbit. Where rabbits are kept in hutches we are advised that good protection can be provided by the use of mosquito-proof screening, together with the use of insecticides. Information on these measures should be made available to domestic rabbit keepers."

Conclusions and Recommendations

"We approved of the attempts made in October and November, 1953, to control the initial outbreaks of myxomatosis in Kent and East Sussex with a view to enabling consideration to be given to the advisability of allowing this virus disease to become established in Great Britain.

We appreciated that these steps might well prove ineffective, but we thought none the less that they ought to be taken. It became clear, however, when further widely scattered outbreaks occurred at the end of November and early in December, which apparently had no connection with the initial outbreaks, that no containing action the Ministry might take could effectively influence the course of the disease. There remained the possibility that the disease might not survive the winter. But it has survived; and we reached our first conclusion that attempts to restrict the spread of the disease from the centres at which it is now established, would serve no practical purpose. If the disease does not die out, we are faced with the alternatives of assisting or inducing its spread as a means of rabbit destruction, or of allowing it to take its course. We are advised that the disease can be spread by a variety of insects and that rabbit-biting mosquitoes in particular are likely to aid its more rapid spread. We do not yet know the extent to which such mosquitoes occur in this country, but research into this problem has already been initiated.

The main argument in favour of the deliberate spread of the disease is that a concerted and widespread attack on the rabbit might reduce it to a point of near extermination, to the great benefit of both agriculture and forestry. On the other hand a myxomatous rabbit is unsightly and is plainly in distress, and strong representations have been made to us on humanitarian grounds against a policy of spreading the disease. We are satisfied that there are clear and obvious objections on humanitarian grounds to infecting an animal deliberately with an unpleasant disease in order to reduce its numbers.

There are also legal reasons for not recommending deliberate spreading of the disease. Whatever may be the position in law of a person who transports a diseased rabbit from one place to another, we are advised that it is likely that a person who deliberately takes a rabbit and inoculates it with the virus would be committing one or both of the offences of 'doing an act causing unnecessary suffering to an animal' and 'administering a poison to an animal without reasonable cause or excuse' (Protection of Animals Act, 1911, Section 1, and Protection of Animals (Scotland) Act, 1912, Section 1). Furthermore we are advised that, under Civil Law, a person who deliberately spreads such a disease on his own land might be held liable for damage caused to a neighbour as a result of the disease spreading to his land or to his stock of domestic rabbits.

Moreover, no disease has ever within human knowledge completely exterminated an animal population.

We have, therefore, reached the second conclusion, in which we are supported by the evidence we have received, that no attempt should be made to assist the spread of myxomatosis, or to introduce it into unaffected areas of the country.

Having satisfied ourselves that any attempts to restrict the spread of the disease are unlikely to succeed, while the deliberate spread of infection could not be justified, we can see no alternative but to let it run its natural course in the wild rabbit population. It is not possible to foresee whether the disease will spread slowly or whether it will spread rapidly as in the epizootics in Australia and France. It may spread more rapidly in low-lying areas, and climatic conditions are likely to play an important part; for instance, if the disease spreads to Scotland, experience there may well be different from that in England and Wales.

Whatever course events take, we are advised that wherever outbreaks occur a small proportion of rabbits may be expected to survive. Some survivors may be immune or resistant to the disease, and we therefore recommend that every effort should be made to eliminate them before they re-populate the area. This opportunity will be unique and every possible advantage should be taken of it.

We appreciate that it may not be easy to persuade everyone who has seen a heavy infestation of rabbits on his land almost wiped out by myxomatosis, to take prompt and energetic measures to destroy the surviving few but it is necessary that all concerned should be convinced that the effort is absolutely essential.

We recognise that the obligation to control and destroy agricultural pests, including the rabbit, rests upon the occupier of land. However, we would urge that the Government should consider how far they can supplement the efforts of occupiers to effect final clearance after myxomatosis where local resources may be insufficient.

With the prospect of the numbers of wild rabbits being substantially reduced or eliminated in some areas by myxomatosis followed by measures to destroy the survivors, we consider that it would be prudent to prevent the importation of such live rabbits as the cottontail rabbit, which, while harbouring the virus, might breed rapidly in this country so as itself to become a pest.

Our conclusions regarding domestic rabbits are set out above and are to the effect that information on the measures to protect them from myxomatosis should be distributed and that vaccine should be made available to domestic rabbit breeders at a reasonable cost.

The foregoing are our conclusions on the position as we see it at the end of the winter. We shall, of course, be keeping developments under close review in the coming spring and summer and will tender further advice as occasion arises.

We also propose to keep under review the programme of research that has already been initiated to study the means by which the disease is transmitted in this country and other related problems as well as the investigations that are being made concerning vaccines."

NOTES AND NEWS

Diary of Events

Apr. 21st.—Meeting of the Royal Society of Medicine, Section of Comparative Medicine, at 1, Wimpole Street, London, W.1, 5 p.m.

Apr. 21st.—Ordinary Meeting of the Royal Microscopical Society at Tavistock House South, Tavistock Square, London, W.C.1, 5.30 p.m.

Apr. 22nd.—Meeting of the Ayrshire Division, B.V.A., in the Hotel Dalblair, Ayr, 2.30 p.m.

Apr. 23rd.—General Meeting of the Midland Counties Division, B.V.A., at the Star Hotel, Worcester, 2.30 p.m.

Apr. 23rd.—General Meeting of the Yorkshire Division, B.V.A., at the Royal Station Hotel, York, 2.30 p.m.

Apr. 28th.—Meeting of the Lancashire Division, B.V.A., at the Midland Hotel, Manchester, 2.30 p.m.

Apr. 28th.—Ordinary General Meeting of the South Eastern Division, B.V.A., at the Royal Star Hotel, Maidstone, 6.30 p.m.

Apr. 28th.—Ordinary General Meeting of the South Eastern Division, B.V.A., at the Royal Star Hotel, Maidstone, 6.30 p.m.

Apr. 30th.—General Meeting of the Mid-West Division, B.V.A., at the Berkeley Café, Clifton, Bristol, 2.30 p.m.

May 1st.—Annual General Meeting of the Association of State Veterinary Officers in the Auditorium of the Wellcome Research Institute, 183-193, Euston Road, London, N.W.1, 2 p.m.

May 6th.—A symposium on "The Design of Animal Houses" at the Royal Society of Medicine, 1, Wimpole Street, London, W.1, 10.45 a.m.

May 12th.—Meeting of the R.A.V.C. Division, B.V.A., at the Canine Research Station, Newmarket, 11 a.m.

Sept. 19th—25th.—72nd Annual General Meeting and Congress of the British Veterinary Association at Torquay.

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PERSONAL

Birth.—Yeoman.—On February 16th, 1954, in London, to Myrtle "Johny" Yeoman, wife of G. H. Yeoman, M.R.C.V.S., of the Colonial Veterinary Service, Iringa, Tanganyika Territory, a daughter.

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Marriages.—Mackay—Watt.—On April 3rd, 1954, at Allan Park Church, Stirling, John Eric Mackay, son of the late Mr. and Mrs. Alexander Mackay, of 6, Rowallan Gardens, Broomhill, Glasgow, to Margaret Millar Robson Watt, daughter of Mr. and Mrs. William Watt, of 19, Abercromby Place, Stirling. The Rev. R. E. Somerville, M.A., officiated.

Orr—Siddall.—On April 5th, 1954, at St. Mary's Church, Diss, Norfolk, Major Ronald Stewart Orr, M.R.C.V.S., youngest son of Mr. and Mrs. J. Orr, Askomil, Bishopton, Renfrewshire, to Joan Margaret Siddall, daughter of Mr. and Mrs. Gilbert Siddall, Waterloo House, Diss, Norfolk.

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R.C.V.S. OBITUARY

Patterson, Joseph Hyslop, Ministry of Agriculture, 15, Moray Place, Edinburgh. Graduated Glasgow, December 16th, 1927. Died April 7th, 1954; aged 51 years.

J. H. Patterson, M.R.C.V.S.

The funeral of the late J. H. Patterson took place on Friday, April 9th, 1954, at Warriston Crematorium, Edinburgh, the service being conducted by the Rev. Andrew Graham who was a lifelong friend of the deceased.

Among those present were many professional colleagues including Messrs. D. S. Barbour, T. Bannatyne and R. C. Mathieson of the Scottish Branch Office, Ministry of Agriculture and Fisheries.

Mr. W. D. Macrae from Head Office, London, also represented Mr. J. N. Ritchie, the Chief Veterinary Officer.

The Ministry's Field Staff and Laboratory Staff were represented by Mr. A. B. Kerr, Mr. G. Durrant, Mr. A. M. K. McLeod, Mr. J. G. Souter (also representing Mr. E. F. Hardwick), Mr. S. Sharp, Mr. W. Grant, Mr. G. G. Rennie, Mr. M. H. W. Miller, Mr. D. W. Deas, Mr. Ian A. Graham (also representing A.S.V.O.), Mr. W. H. Horne, Mr. W. A. Ireland, Mr. M. MacColl, Mr. A. M. Smith and Mr. A. Macleod. Captain W. Watt and Mr. E. A. McPherson (also representing Professor W. M. Mitchell and Professor G. F. Boddie).

Representatives from the Scottish Office Staff were Mr. W. A. Davidson, Mr. E. C. Harvey, Mr. R. Hume, Mr. A. Bishop, Mr. E. Pattenden, Mr. M. Johnston, Mr. J. Barr Sim and Mr. T. B. Thomas.

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RETIREMENT OF DR. A. H. HUNTER

The Animal Health Division of the Ministry of Agriculture announces that Dr. A. H. Hunter, D.V.SC., D.V.M., M.R.C.V.S., D.V.S.M., Veterinary Officer, Mansfield, retired on April 8th, 1954.

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ANIMAL HEALTH TRUST SCHOLARSHIPS

We should like to draw attention to the Notice which appears on page x of this issue referring to Scholarships to be awarded by the Animal Health Trust. Since the Trust's foundation a number of young graduates and veterinary students have benefited from the academic awards granted by this organisation. As our readers may recall, the Trust was originally known as the Veterinary Educational Trust and the academic side of its activities has continued to play an important part in the whole. We believe that something like £35,000 has been spent in awarding Fellowships and Scholarships.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:

Ches.—Bankfield Farm, Plemstall, Chester (Apr. 5).
Cornwall.—Yentongimps Mill, Callestick, Truro (Apr. 5).
Dorset.—Dykes Farm, Stowell, Sherbourne (Apr. 6).
Dumfries.—Kirkland Farm, Terregles (Apr. 7).
Lancs.—Holme Farm, Balderstone, Blackburn (Apr. 5).
Notts.—Mattersey Grange Farm, Mattersey (Apr. 6).
Renfrew.—Auchans Farm, Johnstone (Apr. 8).
Salop.—Moreton Wood Farm, Calverhall, Whitchurch (Apr. 7).

Fowl Pest:

Cambs.—Lyndbury, Little London, Isleham (Apr. 5).
Lancs.—Compton House, St. Michaels, Preston (Apr. 5); Clegg Farm, Grange Lane, Hutton; Hillcrest, Beech House, and Jenkensons Farm, St. Michaels, Preston (Apr. 6); Balls Farm, Brook Lane, Little Hoole (Apr. 10); Peel House, Inskip (Apr. 11).
Leics.—Benstairs Lodge, Little Dalby (Apr. 9).
Lincs.—Walcot, Billinghay (Apr. 10).
Norfolk.—Whitehouse Dairy Farm, Caister-on-Sea (Apr. 10).
Suffolk.—Hall Farm, Fornham-all-Saints, Bury St. Edmunds (Apr. 7).
Warwicks:—Walkers Heath Farm, Guys Hill Lane, Kings Norton, Birmingham (Apr. 7).

Swine Fever:

Cambs.—Valley Farm, Falbourn; Fowlmere Road, Foxton, Cambridge (Apr. 5); Allotments, York Street, Cambridge (Apr. 6).

Ches.—Outwood Farm, Cheadle; Green Farm, Aldersey, Malpas; Moss Farm, Harthill, Reed Lane, Antrobus, Northwich (Apr. 5); Forest Side, Waste Lane, Kelsall; Grange Farm, Stoke, Chester (Apr. 6).

Glouc.—The Cottage, Hailes Fruit Farm, Stanway, Cheltenham (Apr. 5).

Herts.—Harthall Farm, Harthall Lane, Kings Langley (Apr. 8).

Kent.—" Black Rock," Spekes Road, Wigmore, Gillingham (Apr. 5).

Lancs.—Coronation Villas, Beavans Lane, West Derby, Liverpool, 12; Patten Farm, Forton, Preston; 400a, Knutsford Road, Warrington; Bridge Farm, Roe Lane, Southport (Apr. 5); Fairbrother House Farm, Worsley Mesnes, Wigan (Apr. 8).

Leics.—Forest Road Allotments, Forest Road, Leicester (Apr. 7); The Piggeries, Barkby Road, Syston (Apr. 8).

Lincs.—Hall Farm, Leasingham, Sleaford; Richmond Drive Piggeries, Skegness (Apr. 5); Post Office, Leasingham, Sleaford; Simmon House Farm, Old Leake, Boston (Apr. 9).

Norfolk.—" Davros," Gong Lane, Burnham Overy, King's Lynn (Apr. 5); Grange Farm, Whittingdon; Church Farm, Burnham Overy, King's Lynn; Fielden Dairy, Basses Lane, Wells-next-Sea (Apr. 7).

Northants.—The Firs, Hartwell, Northampton (Apr. 6).

Staffs.—Hillsdale Hall Farm, Grindon, Leek (Apr. 7); Harpurs Farm, Rushton, Macclesfield (Apr. 10).

Suffolk.—The Mill, Shottisham, Woodbridge (Apr. 5).

Surrey.—Charterhouse Farm, Godalming (Apr. 7); 177, Croydon Road, Caterham (Apr. 9); 80, Farleigh Court Road, Farleigh (Apr. 10).

Worcs.—Piggeries, Wickhamford Lane, Evesham (Apr. 6).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

MASTITIS THERAPY

Sir,—In connection with the abstract entitled " A New Approach to Mastitis Therapy," appearing in *The Veterinary Record* of April 3rd, 1954, I note that after the intravenous administration of a dose of oxytocic principle, an interval of 20 minutes is allowed before the quarter is stripped. It appears to me that this is much too long a time. This method of supplementing the treatment of mastitis has been in use in this practice for some little time and we have observed that the " let down " of milk occurs within one minute of the intravenous injection of posterior pituitary extract.

As this, presumably, acts on the udder in the same way as does the physiological release of oxytocic principle in normal milk " let down " in the cow, one would expect this effect to commence immediately and last for about four minutes. If this surmise is correct, then after the 20 minutes recommended in the abstract, the " let down " will have ceased, and only the milk in the milk sinus and teat will be drawn off, thus losing the maximum desired effect.—Yours faithfully, E. P. Barrett, 28, Stoke Road, Guildford. *April 6th*, 1954.

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PENICILLIN LEVELS IN COW'S MILK AFTER INTRAMAMMARY INFUSION

Sir,—I have read with interest the contribution of Miss Uvarov and Dr. Muggleton in your issue of April 3rd on " Penicillin Levels in Cow's Milk after Intramammary Infusion of Procaine Penicillin. I would be grateful for the opportunity to make one or two comments especially as they were kind enough to quote the work of my colleagues and I, Hughes *et al.* (1950). It is true to say that we achieved a 90 per cent. bacteriological clearance of *Str. agalactiae* infections by repeated infusions of procaine penicillin at 72-hour intervals, but I must point out, as Uvarov and Muggleton did not, that groups of cows similarly infected in the same herds which were treated with calcium penicillin at 72-hour intervals were equally successfully treated, with a 96 per cent. bacteriological clearance.

Our assays of milk showed that the cows treated with calcium penicillin at 72-hour intervals were without measurable penicillin in their milk for at least 12 hours between infusions. The theme of our argument was that persistence of penicillin milk levels were not necessarily essential for satisfactory sterilisation of *Str. agalactiae* infections.

It was Bigger (1944) who first suggested that interrupted treatment with penicillin might be rational. It is known that penicillin acts against dividing organisms and under a penicillin blanket a number of bacteria in the non-dividing state, Bigger's " persisters," can survive. Interrupted penicillin treatment would allow such organisms to recommence multiplication and so render them susceptible to the next application of penicillin.

Whether these views are sound is a matter of opinion but I think we should consider more critically whether prolonged persistence of penicillin in the udder is always required. In certain circumstances, such as prophylactic infusion for *C. pyogenes* infections it may be desirable, in other cases it may be wasteful.—Yours faithfully, D. L. Hughes, Messrs. Boots Pure Drug Co. Ltd., Research Department, Veterinary Science Division, Thurgarton, Notts. *April 6th*, 1954.

References

Uvarov, O., & Muggleton, P. W. (1954). *Vet. Rec.* **66.** 200.
Hughes, D. L., Christie, G. J., & Farmer, R. K. (1950). *Ibid.* **62.** 11.
Bigger, J. W. (1944). *Lancet.* **247.** 6370. 497.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th March, 1954	16	2	49	—	58
Corresponding period in—1953	43	2	14	—	93
1952	23	3	10	—	44
1951	21	2	14	—	25
1st January to 15th March, 1954 ...	60	10	368	—	282
Corresponding period in—1953	250	21	171	—	386
1952	97	29	55	1	206
1951	126	17	428	4	176

Advertiser's Announcement

Myxomatosis Vaccine

Burroughs Wellcome & Co. announce the introduction of 'Wellcome' brand Myxomatosis Vaccine for the immunisation of domestic rabbits. The vaccine which is prepared in The Wellcome Research Laboratories is a tissue suspension containing the virus of Shope fibroma. A dose of 0·5 c.c. injected subcutaneously provides a useful level of protection, lasting at least six months in the great majority of rabbits.

'Wellcome' Myxomatosis Vaccine is issued in bottles of 5 c.c. (10 doses). Since this living virus vaccine may not remain potent for more than 14 days from the date of preparation, members of the profession should order material to meet known requirements only.